INCIDENT

Aircraft Type and Registration:	Sud Aviation SA342J Gazelle, YU-HET	
No & Type of Engines:	1 Turbomeca Astazou XIVH turboshaft engine	
Year of Manufacture:	1975 (Serial no:1204)	
Date & Time (UTC):	06 July 2015 at 1205 hrs	
Location:	Stapleford Aerodrome, Essex	
Type of Flight:	Event occurred during maintenance check	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damaged beyond economic repair	
Commander's Licence:	N/A	
Commander's Age:	N/A	
Commander's Flying Experience:	N/A	
Information Source:	AAIB Field Investigation	

Synopsis

The helicopter inadvertently became airborne during a hydraulic system check with the engine running. It was not possible to determine why the helicopter became airborne. During the investigation it was found that the pressure switch was not fitted to the hydraulic pack and hence the low hydraulic pressure warning would not activate. A safety concern relating to the overhaul of the engine was also identified.

Introduction

This event occurred during a maintenance check on the hydraulic system with the engine running. The AAIB was notified and decided to investigate, since there was the perceived potential for aviation safety benefit.

Description of the incident

The helicopter was undergoing a maintenance check near to the maintenance organisation's hangars. The engineer was ground running YU-HET and checking the hydraulic system when the incident occurred. According to his report the collective lever was fully down and he had applied full friction to the lever. He commenced the low hydraulic pressure check by activating the hydraulic test switch on the instrument panel; his left hand was on the collective lever and his feet were on the yaw pedals. On activating the test switch the collective lever "came up violently", the helicopter lifted about 10 ft into the air, and yawed to the right. It turned through 180° and a main rotor blade struck the ground. The helicopter then landed heavily, causing significant damage to the canopy, cabin floor, tail boom, the right skid and a main rotor blade.

Aircraft information

The SA341 Gazelle is a single-engine helicopter which has hydraulically-assisted flying controls to reduce the pilot's control loads. A hydraulic pack, driven from the Main Rotor Gearbox, supplies hydraulic power to three main servo controls mounted below the rotor head.

YU-HET was originally constructed as a SA341G and was converted to the faster and more powerful SA342J in the 1980s. There is a mandatory Service Bulletin SB 29-02, applicable to the SA342J, which requires the fitting of three accumulators (one on each of the main servo controls), a pressure switch to detect low hydraulic pressure, a warning light and warning horn. This SB was optional on the SA341G variant.

In the event of low hydraulic pressure, the pilot is alerted by the warning horn and the warning light. The accumulators provide a reserve of hydraulic power to allow the pilot to reduce the airspeed so that the control forces are more manageable.

The pilot is required to test the low hydraulic pressure warning system prior to each flight to verify that the system is operational. This forms part of the pre-flight checks.

Inspection and test

YU-HET was inspected by the AAIB and a test of the hydraulic system was performed with a specialist from the helicopter manufacturer present. The hydraulic pack and the accumulators were found to operate satisfactorily, however it was found that there was no pressure switch fitted to the hydraulic pack; hence the low pressure warning light and the warning horn would not operate. Without these warnings the pilot would not become aware of a loss in hydraulic pressure until he was presented with significantly increased control forces.

Moreover, it would not have been possible to comply with the pre-flight checks, which required the pilot to test that the low hydraulic pressure warnings are operational prior to each flight.

Maintenance records

Airworthiness Review Certificate

YU-HET held an Airworthiness Review Certificate, issued by the Serbian Civil Aviation Department on 25 March 2015.

Service Bulletin SB 29-02

The helicopter's maintenance records were reviewed as part of the investigation. It was not possible to be certain, but it is likely that SB 29-02 was carried out by the manufacturer on this helicopter when they converted it from a SA341G to a SA342J in the 1980s.

YU-HET was registered in France as F-GFDG and was brought to the UK in early 1999. At that time, the SA342J model was not type certified in the UK and the helicopter remained

on the French register. It was then transferred onto the Serbian register in November 2004 as YU-HET.

In 2000, the helicopter had its 12-year inspection, during which the hydraulic pack was removed and fitted to another Gazelle helicopter. It is likely that the hydraulic pack was removed, along with the pressure switch and associated wiring. When the replacement hydraulic pack (the hydraulic pack fitted at the time of the incident) was installed, it would have arrived without a pressure switch, as this is how the hydraulic packs were supplied. It is probable that the pressure switch was not installed at that time and the helicopter may therefore have been operating without the pressure switch since 2000.

Engine overhaul approval

The engine fitted to YU-HET was an Astazou XIVH, a civilian version. It was overhauled in 2005 by an organisation in Serbia and issued with a Serbian Certificate of Release to Service. This organisation held Serbian approval MO-003. The organisation was approved to overhaul the military version of the engine (Astazou IIIB), but it was not authorised by the engine manufacturer to overhaul civilian versions of the engine. Manufacturer's approval ensures that the organisation performing the engine overhaul has access to the most up to date technical information on the engine.

As part of the investigation into the accident to a Gazelle with the registration YU-HEW in 2009, the AAIB made the following Safety Recommendation:

Safety Recommendation 2009-084

It is recommended that the Serbian Civil Aviation Department review its oversight and audit system to ensure that aviation maintenance organisations in Serbia release to service only items for which they have the correct approvals.

Following this recommendation the Serbian Civil Aviation Department (CAD) responded to the AAIB in writing, stating that *'the maintenance approval MO-003 had been revoked on 15 September 2008'.*

During this investigation the Serbian CAD informed the AAIB that they had audited the organisation which held Maintenance Organisation Approval Certificate MO-003. In 2011 the Serbian CAD issued this organisation a Maintenance Organisation Approval Certificate number RS.N.145.0035 with rating B1 which gave privilege for, amongst others, Astazou IIIA, IIIB, XIV H and XIV M engines. The Serbian CAD also ruled that the documents previously issued under approval MO-003 were valid. However, at no stage has this organisation been authorised by the engine manufacturer to overhaul civilian versions of the engine.

The absence of the engine manufacturer's approval to overhaul civilian versions of the engines may be a concern for airworthiness authorities in other States. Accordingly the AAIB will write to the EASA and the UK CAA to bring this issue to their attention.

Discussion

The inspection of the aircraft revealed nothing that would explain why the helicopter inadvertently became airborne. Hence the cause of this incident could not be determined.

The investigation established that the hydraulic low pressure switch was not installed on the helicopter, rendering the low hydraulic pressure warning system ineffective. Although the helicopter would be controllable after a loss in hydraulic pressure, the warning is essential to allow the pilot to reduce airspeed so that the control forces become more manageable.

The manufacturer was not aware of any other occurrences when the hydraulic low pressure switch was not installed. Such an omission is a deviation from the maintenance procedures and hence no Safety Recommendation is required.

This incident occurred during maintenance and would not normally be investigated by the AAIB. However, the investigation was justified in that it identified safety concerns relating to the failure to install the hydraulic low pressure switch and to the release of the engine to service after overhaul.

Appendix

Chapter 6.3 of Annex 13 to the Convention on International Civil Aviation provides that the State conducting the investigation shall send a copy of the draft Final Report to all States that participated in the investigation, inviting their significant and substantiated comments on the report as soon as possible. If the State conducting the investigation receives comments within the period stated in the transmittal letter, it shall either amend the draft Final Report to include the substance of the comments received or, if desired by the State that provided comments, append the comments to the Final Report.

The Centre for Investigation of Accidents in Transport, representing the Republic of Serbia as the State of Registry, wishes the following comments to be appended to the AAIB Final Report on the incident involving SA342J Gazelle (YU-HET), at Stapleford Aerodrome, on 06 July 2015:

'a. Approval for maintenance of aircrafts, engines and/or components is under jurisdiction of Civil aviation authority, so Civil Aviation Directorate of the Republic of Serbia (CAD RS) accepted all previous issued Certificates of release to service (Form No. 1) for engines, about which CAD RS informed interested parties (EASA and AAIB UK primarily).

b. Since airworthiness of all aircraft that do not fulfill all requirements defined by Regulation on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organizations and personnel involved in these tasks, Annex II, part 145 ("Official Gazette of the Republic of Serbia", No 32/11, 23/12 u 27/12-correction and 10/14; in accordance with EC 2042/2003 and Amendments) in which belong

helicopters that are in UK, of user ``M. W. Helicopters ltd, Beograd``, is done in accordance with national regulation, that means that all works and documentation is acceptable to CAD RS if they are in accordance with national regulation and Air transport law of the Republic of Serbia; on this way, airworthiness was returned to all helicopters, after Initial aircraft inspection was carried out, in accordance with Article 159. of Air transport law of the Republic of Serbia, during Years 2011. and 2012.'